

MEASUREMENT COMPUTATION **news**

product advances from Hewlett-Packard

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HP's new transportable personal computer offers the UNIX[™] operating system

Now you can have the power of a UNIX[™] operating system in a personal, transportable computer. Hewlett-Packard's new Integral Personal Computer is a 25-pound, flexible-disc-based computer with multitasking and multiwindow capabilities. Its operating system is HP-UX[®]/RO 2.1, derived from the UNIX System III operating system. Based on the Motorola 68000 16/32-bit processor and a 16-bit HP graphics processor, this powerful computer provides fast response to user commands, including graphics commands.

The Integral PC's name derives from its fully integrated packaging. Housed within this single unit are a built-in ThinkJet Printer, a 90-key full-size keyboard with numeric pad, a 3 1/2-inch double-sided disc drive, and a nine-inch electroluminescent display. The 512-X-255-pixel flat-panel amber display is bit-mapped and features an adjustable viewing angle for easy reading.

Multitasking, multiwindow capabilities

The Integral PC can perform several processes at the same time. It can print files or monitor instruments while you do other computer-aided activities such as spreadsheet analysis. You can keep track of all these activities by using the HP Windows capability, which provides layering of multiple 24-line-by-80-character windows in the display.

Expandable memory and I/O capabilities

Standard memory is 800K bytes, including 512K bytes of user RAM and 32K bytes of display RAM. An additional 1.5M bytes of RAM can be installed in the system itself, and up to 5.5M bytes can be achieved by using optional dual bus expanders.

The Integral PC's 256K-byte ROM contains the operating system, HP Windows, and Personal Applications Manager

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Finite element software provides low-cost, easy-to-use design aids

Hewlett-Packard's new HP-FE Finite Element System is a low-cost, user-friendly software program for determining physical characteristics of complex structures. Because HP-FE runs on HP 9000 Desktop Computers, you don't need the large mainframe computers typically required for most finite element analysis programs.

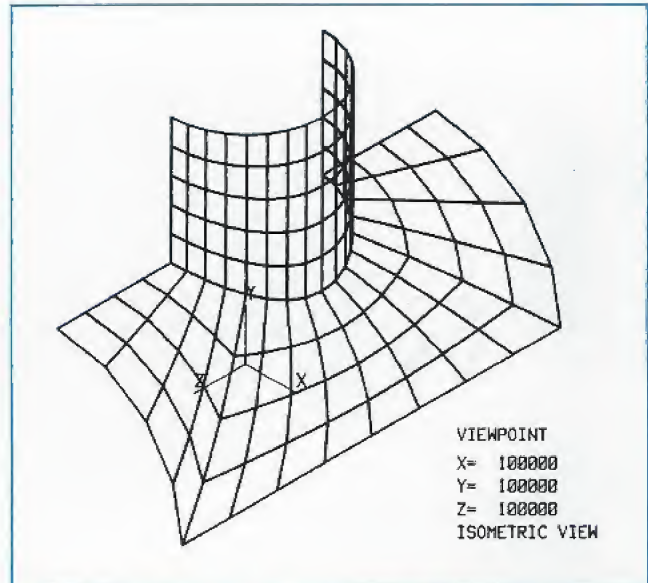
This easy-to-use software offers many of the same capabilities as larger finite element systems. It can serve either as a complementary system for finite element specialists or as a tool for design engineers who may be unfamiliar with finite element techniques.

The design capabilities of HP-FE include a comprehensive element library composed of springs, beams, shells, plates, membranes, solids, and boundary heat-transfer elements. Automatic mesh generation is also available for models with complex geometry, allowing you to choose desired parameters at the keyboard.

Checking design work is simplified, thanks to HP-FE's interactive editing and flexible 3-D visualization capabilities. Both preprocessing and postprocessing graphics are available for quick interpretation of results.

HP-FE is part of Hewlett-Packard's growing family of software engineering solutions. HP-FE's access to HP Draft drawings, which link to programs that create tapes for NC (numerically controlled) machine tools, means that you define the geometry only once for design, analysis, and numerical control. You can now develop a new concept using HP Draft and transfer the data to HP-FE using HP DesignLink.

Typical applications for HP-FE include designing and analyzing mechanical and machine components, electronic de-



With HP-FE software you can produce a two-dimensional or three-dimensional plot of mesh models, such as this pipe intersection model.

vices, and automotive exhaust systems and structural and thermal analysis of space structures.

Price of the HP-FE Finite Element System is \$14,000. For more information, check **B** on the HP Reply Card.

New transportable personal computer

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(PAM). PAM simplifies the use of the operating system by providing a shell to access the system's capabilities without having to use standard UNIX operating system commands. An HP-UX commands disc provides traditional UNIX operating system shells, including the Bourne and C shells. Also included with the package are software discs containing a tutorial for computer-aided instruction (CAI), system utilities, standard applications, and diagnostics.

An HP-IB (IEEE 488) expansion interface is standard with the Integral PC, letting you daisy chain up to 14 instruments or peripheral devices. Up to five interface options can be plugged into the I/O slots, including an RS-232-C serial interface, a general-purpose 16-bit parallel I/O interface, an HP-IL (Hewlett-Packard Interface Loop) interface, a binary-coded decimal interface, and a current-loop interface.

Two HP-HIL (Hewlett-Packard Human Interface Loop) ports on the front of the unit let you plug in a variety of human-input devices, including the HP-HIL keyboard, a mouse, a bar code reader, or a graphics tablet. An optional 300-to-1200-baud modem is available for data communications.

Instrument controller capabilities

By adding HP's new HP-UX Technical BASIC language, you can use the Integral PC for instrument control and data acquisition. HP-UX Technical BASIC is largely compatible with the HP Series 80 BASIC language, providing the same

mathematics, HP-GL (Hewlett-Packard Graphics Language), and I/O capabilities. Also included are the Series 80 BASIC ROM enhancements, such as the I/O, printer/plotter, mass storage, and matrix ROMs, and the I/O drivers, including HP-IB, GPIO, BCD, and HP-IL.

Also available are C and other programming languages and I/O enhancements such as DIL (device-independent library) and real-time extensions, which include real-time priority, software signals, shared memory, memory lock, sync file system, interval timer, and time of day. The DIL is designed to let you control instruments programmatically in conjunction with HP-UX, using C and other languages.

A variety of personal productivity software is available for the Integral PC, including HP's MemoMaker for writing memos and reports, DataComm, a character-mode terminal emulator with file transfer, and Personal Card File. Other commonly used packages include Multi-plan™ for spreadsheet analysis, Unify™ for data base management, and VT/E™, a VT100 full terminal emulator.

The Integral Personal Computer (Part No. 9807A) is priced at \$4,995.

For more information, check **A** on the HP Reply Card.

*HP-UX is Hewlett-Packard's implementation of the UNIX operating system.

UNIX™ is a trademark of AT&T Bell Laboratories.

Multi-plan™ is a trademark of Microsoft Corporation.

Unify™ is a trademark of Unify Corporation.

VT/E™ is a trademark of P2/i.

32-bit engineering computer system offers more power at lower cost

The newest member of the HP 9000 Series 500 Technical Computer family, the Model 550 Engineering Computer System, offers high performance, compact size, and expandable memory at a lower cost than current Series 500 members and many other comparable computers. This 32-bit computer features new floating point math hardware (standard on the new CPU boards), built-in HP-IB (IEEE 488), and an enhanced HP-UX* operating system.

Designed for use with either a single-user or multiuser workstation, the compact Model 550 measures 13 × 9 × 21 inches and fits in a small rack or taboret. Its low noise level—less than 50 dBA—lets you use the Model 550 in a normal office environment without noise-buffering equipment.

Floating point hardware and memory expansion features

The high-speed performance of the Model 550's floating point hardware lets you complete computation-intensive problems in less time than most comparable equipment. When you perform simulation, modeling, and analysis, execution times are cut considerably in single-precision and double-precision routines. You can dedicate one Model 550 to as many as 32 users and add up to two additional CPU boards for increased performance, power, and flexibility without adding another computer.

You can increase the Model 550's memory up to 5M bytes using ½M-byte RAM boards or up to 10M bytes using 1M-byte RAM boards.

Latest HP-UX operating system offers multitasking capabilities

The Model 550 boasts the new HP-UX 4.0 operating system, which features additional commands, more efficient virtual memory, a symbolic debugger for three languages, and the Device I/O Library. It is compatible with software programs that run on or were written on the Models 530 and 540.



The compact HP 9000 Series 500 Model 550 Engineering Computer System offers floating point hardware, increased memory, and the latest version of the HP-UX operating system.

The HP-UX 4.0 operating system offers multitasking capabilities that let you analyze programs in the background while developing finite element models in the foreground. You can achieve a fivefold to tenfold gain in productivity by networking a series of Model 550 computers.

The floating point CPU, 1M-byte RAM boards, and HP-UX 4.0 operating system can be added as performance upgrades to existing Series 500 systems.

The base system for the Model 550 Engineering Computer System is priced at \$19,425. The bundled single-user version is \$34,105, and the bundled multiuser version is \$36,325.

For more information, check **C** on the HP Reply Card.

*HP-UX is Hewlett-Packard's implementation of the UNIX™ operating system. UNIX™ is a trademark of AT&T Bell Laboratories.

Terminal emulator software lets you use HP 9000 Series 200 computers with many mainframes

Now your HP 9000 Series 200 Computer can function as an asynchronous alphanumeric terminal with almost any mainframe computer manufactured today. Hewlett-Packard's new HP 2392A and VT100™ Terminal Emulator lets your Series 200 Computer act as a terminal with mainframes manufactured by HP, DEC™, Data General, DCD, Prime, and many others.

This new terminal emulator consolidates three of HP's Pascal 2.1-based emulators for asynchronous, alphanumeric terminals into one Pascal 3.0-based product. It replaces the Asynchronous Terminal Emulator, the HP 2622A Terminal Emulator, and the VT100 and HP 2622A Terminal Emulator.

Your Series 200 Computer retains all of its engineering and computational capabilities, while imitating two commonly used terminals—the HP 2392A and the DEC VT100. The new emulator supports all Series 200 computers except the Model 226 and all Pascal 3.0 peripheral devices, as well as executing directly from Pascal 3.0.

This new emulator software lets you perform the following tasks:

- Develop and run programs on a host computer
- Access host peripherals, files, and time-sharing systems

- Transfer ASCII files between a host computer and your systems
- Run programs designed specifically for HP 2392A and VT100 terminals.

The HP 2392A emulator runs HP software programs such as HP DeskManager (for office automation) and HP Slate (for word processing). Features include block, line modify, and character modes, international keyboard support, and X.25 network compatibility.

The DEC VT100 emulator runs DEC software programs such as VAX™ EDT editor, Datatrieve™, and ALL-IN-1™. It features local mode or split screen and video enhancements.

The emulator's security scheme locks the software to a specific Series 200 Computer using its ID PROM. ID PROM upgrades are available.

The HP 2392A and VT100 Terminal Emulator software is priced at \$500.

For more information, check **D** on the HP Reply Card.

DEC™, VT100™, VAX™, Datatrieve™, and ALL-IN-1™ are trademarks of Digital Equipment Corporation.

Easy-to-use software solution designed for just-in-time manufacturing



Hewlett-Packard has drawn on its extensive experience with just-in-time manufacturing to design an easy-to-use software solution for manufacturers using these production techniques. This software package, HP JIT, is being used by a number of HP divisions to achieve reductions in inventory, floor space requirements, and scrap and rework and an increase in labor efficiency.

A just-in-time production line is dramatically different from the traditional work-order-based assembly process. HP JIT is a work-orderless system that relies on frequent deliveries of components directly to assembly line work stations.

Helps you specify, plan, and control

Three software modules contain the HP JIT functions:

- **Manufacturing Specifications:** This module is used to define the manufacturing process and the deduct lists, which identify the parts consumed at any point in the production process.
- **Materials Planning:** This includes rate-based master scheduling to determine the planned output rate per day.
- **Manufacturing Control:** This is used for production reporting, inventory management, and material cost reporting.

An interactive package, HP JIT displays time-critical information immediately on screen in a form designed for people in a manufacturing environment. It makes extensive use of prelabeled special function keys, simple menus, and fill-in-the-blank terminal screens, making it easy to use for both novices and experienced computer users. Also available is an HP training course covering both the just-in-time concepts and the implementation of HP JIT.

This software runs on HP 3000 Business Computer systems and incorporates the use of the recently introduced enhanced HP 150 (Touchscreen MAX in North America) Personal Computer as an integrated workstation. Standard customization features let you modify HP JIT to fit your manufacturing processes without programming or changing the source code.

HP JIT can be used either in stand-alone applications or fully integrated with HP Materials Management/3000 for environments that require both just-in-time and work-order production control. It is available worldwide in English, and local-language versions are now being developed in a number of countries.

The HP JIT software is priced at \$60,000. HP JIT Touch, the software linking the HP Touchscreen MAX (enhanced HP 150) Personal Computer, is \$1,000. Contact your local HP sales office for system prices.

For more information, check **E** on the HP Reply Card.

New software available for HP 9000 Series 200 Computers and the Integral PC

Four new productivity packs are now available for use with the HP 9000 Series 200 MC68000-based computers and Hewlett-Packard's new Integral Personal Computer. When you use the new software packs with these powerful HP-UX*-based computers, you can have better control of the business side of engineering. Daily, time-consuming tasks such as writing memos and making calculations are easier to perform.

Project management with MicroTrak/HP-UX™

With this project management system, you can schedule projects such as the introduction of a new product or the production of a year-end report. This system automates scheduling and facilitates updating based on your actual progress.

Spreadsheet analysis with Multiplan/HP-UX®

You can quickly find the answers to your planning, modeling, and forecasting questions with Multiplan. This powerful program has extensive arithmetic functions and handles complex calculations easily through a set of simple commands.

Financial analysis with Calculator/HP-UX

With this software, four sets of calculator functions are available at your fingertips: mathematics, statistics, trigonometry, and financial operations. Results can be tabulated quickly and easily and transferred to other applications.

Word processing with MemoMaker/HP-UX

MemoMaker is an ideal program for quickly generating memos, business letters, and reports. Simple to learn, this software offers sophisticated formatting functions.

System requirements

These software packs can run on the Integral PC or the HP 9000 Series 200 models that have HP-UX 2.1 or 2.2 operating systems. The standard media for all four packs is double-sided 3½-inch flexible discs. They are also available on ¼-inch tape as Option 022.

Prices for these new software packs are as follows:

- | | |
|---|---------------------------|
| ■ MicroTrak/HP-UX | ■ Multiplan/HP-UX |
| single-user version \$775 | single-user version \$345 |
| multiuser version \$1,550 | multiuser version \$595 |
| ■ MemoMaker/HP-UX | ■ Calculator/HP-UX |
| single-user version \$195 | single-user version \$75 |
| multiuser version \$395 | multiuser version \$150 |
| Option 022 ¼-inch-tape format is \$125. | |

For more information, check **F** on the HP Reply Card.

*HP-UX is Hewlett-Packard's implementation of the UNIX™ operating system.

UNIX™ is a trademark of AT&T Bell Laboratories.

MicroTrak™ is a trademark of SofTrak™ Systems.

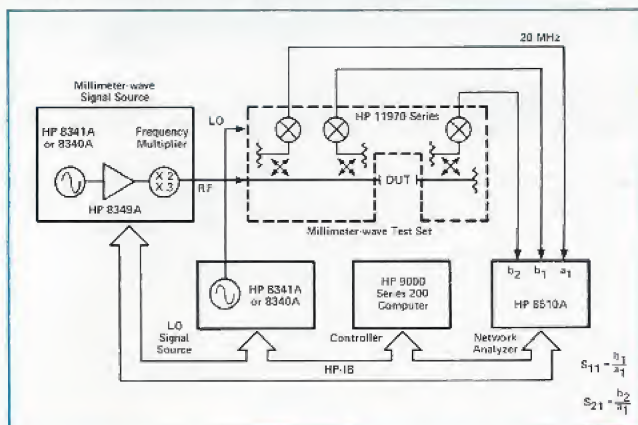
Multiplan® is a registered trademark of MicroSoft®, Inc.

How to build a millimeter network analyzer using HP 8510A analyzer

Using commercially available waveguide hardware, you can configure the powerful capabilities of the HP 8510A Microwave Network Analyzer to work with millimeter wave frequencies by following the instructions in Hewlett-Packard's new Product Note 8510-1. Titled "Millimeter Wave Vector Measurements Using the HP 8510A Network Analyzer," this note describes in full detail how to assemble and operate automatic measurement systems for waveguide bands in the frequency range of 26.5 GHz to 60 GHz. An index lists manufacturers of required millimeter waveguide items.

Following this approach, HP engineers have achieved 80-dB dynamic range, ± 0.005 dB and 0.5 degree sweep-to-sweep measurement repeatability, and measurement time of less than 30 seconds for an error-corrected, one-path, two-port measurement at 201 frequencies.

For your free copy, check **G** on the HP Reply Card.



This simplified block diagram shows a millimeter-wave network analyzer based on the HP 8510A analyzer.

Improved phase noise test set now measures pulsed carriers to 18 GHz



Designed to meet the increasing demands of carrier phase noise testing, Hewlett-Packard's new HP 11729C Carrier Noise Test Set features three new capabilities in addition to those of its predecessor, the HP 11729B. The first is a 640-MHz surface acoustic wave (SAW) filter that improves the broadband noise floor of the external reference signal from the HP 8662A Synthesized Signal Generator. At a 10-MHz offset from a 10-GHz carrier, the noise floor is typically -145 dBc/Hz, compared with -135 dBc/Hz, which is typical for the B model.

The HP 11729C also provides an internal 640-MHz SAW fixed oscillator for the frequency discriminator method of measuring free-running sources such as tunable GaAsFET, Gunn-diode, or YIG-tuned sources. Because it discriminates at intermediate frequencies, the HP 11729C makes it easy to achieve a low-loss delay line, while providing sufficient delay for high detection sensitivity. Additional circuitry in the HP 11729C helps make AM noise and phase noise measurements of many pulsed sources.

The HP 11729C is fully programmable via the HP-IB (IEEE 488) and measures test signals from 10 MHz to 18 GHz.

The HP 11729C is priced at \$21,500, the same as the B model. For more information, check **H** on the HP Reply Card.

Components

New flat-top lamps provide bright light in compact package

Ask for a sample lamp from Hewlett-Packard's new family of flat-top LED lamps, and see how you can create a bright, colorful message in a compact package. Just 2 mm in diameter, these lamps reach luminous intensities up to 3.0 mcd at 10 mA and are even brighter at higher drive currents.

You can choose from a range of design alternatives in all three standard colors. Low-current, integrated resistor, and high-brightness versions are available in high-efficiency red, yellow, and green.

These new flat-top lamps mount flush with the front panel. Uniform light output and wide viewing angle lend attractiveness and efficiency to handheld instrument, switchboard, and other front-panel designs.

In quantities of 5,000 to 9,999, these lamps range in price from 26 cents to 43 cents, depending on the version and color you select.

For a sample lamp and further information, check **I** on the HP Reply Card.



High-speed fiber optic receiver features low noise and high sensitivity

Hewlett-Packard's new HFBR-2207/2208 PIN Photodiode Fiber Optic Receiver operates at speeds up to 150 MHz and offers low noise and high sensitivity. Designed for use with the HFBR-1202/2204 Transmitter, this new high-speed receiver serves as a low-cost alternative to metallic links for many applications in communications equipment, military, avionics, new generations of computers, and other markets.

Low noise and high sensitivity

The HFBR-2207/08's low noise, low capacitance, and high response levels provide increased sensitivity of receiver circuits at high data rates. The receiver's dark current (that which passes through the photodiode when no light shines on it) measures a low 300 pA at 20V reverse bias.

Improved noise performance of preamplifier circuits results from the HFBR-2207/08's low 1.6-pF capacitance. The receiver offers a minimum sensitivity of 0.29 A/W, which includes the optical power lost in coupling light from the fiber onto the pin photodiode as well as the response of the photodiode itself.

Easy-to-install, miniature packaging

The receiver's miniature package integrates the pin photodiode into a fiber optic connector receptacle, saving assembly time. This durable metal package is designed to withstand a range of conditions in most industrial applications.

Consistent high optical coupling efficiency results from the alignment of the pin photodiode in the connector receptacle.



The new HFBR-2207/08 PIN Photodiode Fiber Optic Receiver provides a low-cost alternative to metallic links in a variety of applications. It is available with either HP or SMA connectors.

In quantities of 100 to 249, the HFBR-2207/2208 PIN Photodiode Fiber Optic Receiver is priced at \$22.50 each and is available through authorized HP components distributors.

For more information, check J on the HP Reply Card.

HP introduces three new silicon bipolar transistors



Now you can choose from three new Hewlett-Packard silicon bipolar transistors that feature a common collector configuration and let you use just one power supply. The new HXTR-4103/04/05 Bipolar Oscillator Transistors are designed for use in local oscillator applications such as radar, microwave links, CATV distribution equipment, and TVRO receivers.

For frequencies up to 5 GHz, the HXTR-4103 offers high oscillator output power and high dc-to-RF efficiency. At just 2 GHz, oscillator output power is typically as high as 30 dBm, and collector efficiency is 43%.

Designed for medium-power oscillator applications, the HXTR-4104 and HXTR-4105 transistors offer low-cost performance. The HXTR-4104 performs up to 8 GHz, and at 4 GHz it typically provides 20 dBm oscillator output power. The HXTR-4105 is designed for low phase noise applications to above 8 GHz. Oscillator output power at 6 GHz is typically 14 dBm. Both transistors are housed in a metal/ceramic hermetic package.

In quantities of 1,000 to 2,499, prices for these new bipolar oscillator transistors are as follows: the HXTR-4103 is \$30.00 each, the HXTR-4104 is \$4.75 each, and the HXTR-4105 is \$5.20 each.

For more information, check K on the HP Reply Card.

Semiconductor analysis systems simplify measurements and reduce development time and costs

Two new products designed for measurement and analysis of semiconductor materials and devices are now available from Hewlett-Packard. The HP 4063A Semiconductor Parameter Analysis System and the HP 4064A DLTS Analysis System both feature menu-driven software for easier operation and programming. A wide selection of application programs enables you to perform a variety of measurements.

Automatic, computer-controlled measurements

The HP 4063A can make precise measurements at the wafer stage, allowing you to modify the production process. This capability saves costly development time and results in better quality and higher yields. Stable dc measurements with 1 fA and 10 μ V resolution are possible. Capacitance measurements at 1 MHz can be made to 1 fF.

All measurements can be made through any channel of the standard six-channel or optional twelve-channel switch matrixes. These matrixes and all test leads are fully guarded to provide noise-free, low-current measurements, allowing high resolution and accuracy.

Available with the system are prober-control software for wafer devices and test fixtures for packaged devices. These features let you make the accurate resistivity, capacitance-vs-time, and doping profile measurements necessary for evaluating bipolar and MOS devices. Menu-driven application software can be customized easily using the system's test-sequence programming function.

DLTS measurement system saves time and labor

Sensitive deep-level transient spectroscopy (DLTS) measurements, which once required considerable time and labor to perform, can now be made easily with the new HP 4064A. When installed with a temperature controller and cryostat (not supplied by HP), the HP 4064A lets you make complex measurements as soon as installation has been completed. The system is sensitive enough to measure trap levels down to 0.09 eV.

Once you have defined measurement conditions using the menus and softkeys, you can perform a range of measurements, including DLTS signal plots, Arrhenius plots, and capturing cross-section calculations. You can make C-t and C-V capacitance measurements with up to 1 fF resolution and capacitance-vs-time measurements with up to 10 μ s resolution.

A variety of application software is available to help simplify complex measurements. For example, one DLTS routine plots

multiple signal plots from a single temperature sweep, providing large amounts of data quickly and easily. Other programs can be used to calculate capacitance characteristics, such as flat-band voltage, surface-charge density, and substrate impurity concentrations. A test-sequence programming function lets you combine preset setups and display formats with utility programs to meet your specific requirements.

The DLTS measurement capabilities of the HP 4064A are also available as an option with the HP 4063A system.

The HP 4063A Semiconductor Parameter Analysis System is priced at \$84,600, not including controller or mass storage devices. The optional 12-channel switching matrix is \$29,300, and the DLTS option is \$11,400. The HP 4064A DLTS Analysis System is \$28,000, not including controller or mass storage equipment.

For more information, check **L** on the HP Reply Card.



The HP 4063A is designed to reduce the time and labor required for measurement and analysis of semiconductor materials, circuits, and devices. It is shown here with an HP 9000 Model 236C Personal Technical Computer as controller, an HP 2671G Graphics Printer, and an HP 7908P/R 16.5 Mbyte Disc/Tape Drive.

HP newsletter provides information about frequency and time products

Now in its fourth issue, *THE HP STANDARD* newsletter publishes information about the technological innovations and products that contribute to Hewlett-Packard's leadership in frequency and time standards. Each issue offers technical articles, new product information, and updates on existing products.

Published two or three times a year, *THE HP STANDARD* also provides application information, service and maintenance

hints, news of special options, and notices of upcoming seminars and trade shows.

Included with each issue is a prepaid reply card for ordering HP literature or adding new subscribers to the mailing list.

To receive the most recent issue and to add your name to the mailing list, check **M** on the HP Reply Card.

Oscilloscope combines single-shot waveform capture with sophisticated logic triggering

Hewlett-Packard recently introduced the HP 54200A/D Digitizing Oscilloscope, the second product in the company's new line of programmable digitizing oscilloscopes. The HP 54200A/D captures 200 megasamples per second, making it ideal for dealing with high-speed, single-shot events. Transients as narrow as 10 ns can be captured easily.

Friendly design, a 50-MHz bandwidth, and a variety of automatic measurement capabilities make the HP 54200A/D a powerful addition to a designer's electronic bench or to automatic test systems. The D model provides sophisticated triggering modes similar to those available in logic analyzers.

The HP 54200A/D features pretrigger viewing that lets you see what happened before the trigger event. You can get fast, repeatable answers with the instrument's built-in automatic pulse-parameter measurements. This capability means less setup time, less programming, and faster test times.

Display and store modes for greater versatility

The HP 54200A/D offers a choice of display and store modes that give you increased measurement versatility. The *average mode* extracts the signal from uncorrelated noise, letting you probe in noisy environments.

The *envelope mode* is used when measuring worst-case values, such as worst-case jitter and drift. The *accumulation mode* retains all previously acquired data on-screen, while continuing to gather and display waveform information.

Waveform acquisition and triggering capabilities

With two proprietary analog-to-digital converters, the HP 54200A/D provides two-channel simultaneous acquisition without sacrificing sample rate. With its state trigger capability, it can trigger on parallel words up to 27 bits wide with up to four sequence terms. The D model also provides bit-fault modes that trigger the instrument when an extra bit or a missing bit is detected in a serial data stream.

Ease-of-use features

With the HP 54200A/D you can document measurements quickly, easily, and accurately using a one-button instant

hardcopy output to HP printers and plotters. A dc offset feature lets you focus on a particular area of interest on the waveform to make high-resolution measurements.

Up to four front-panel setups can be saved and recalled in nonvolatile memory. The HP 54200A/D has four memory locations in which a waveform, averaged waveform, or waveform envelope can be stored for later analysis.

The HP 54200A Digitizing Oscilloscope is priced at \$7,600, and the D model is \$9,800.

For more information, check **N** on the HP Reply Card.



Competitively priced, the new HP 54200A/D Digitizing Oscilloscope can be used for capturing high-speed, single-shot and repetitive events at 200 megasamples per second.

hp MEASUREMENT **COMPUTATION news** product advances from Hewlett-Packard

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